

WHAT IS CLAIMED IS:

1. A vibration-proof apparatus comprising:

a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion;

a second mounting member which is connected to the other of the vibration-generating portion and the vibration-receiving portion;

an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion;

a pressure-receiving liquid chamber whose partition is partially formed by the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body;

a sub-liquid chamber which communicates with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber;

a movable partition portion which forms a part of the partition of the pressure-receiving liquid chamber, and which is movably supported in a direction in which the internal volume of the pressure-receiving liquid chamber expands or contracts;

an equilibrium chamber which is disposed adjacent to the pressure-receiving liquid chamber, through the movable partition chamber;

a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and

a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion, wherein

a plurality of the switching valves is connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion.

2. A vibration-proof apparatus comprising:

a first mounting member which is connected to one of a vibration-generating portion and a vibration-receiving portion;

a second mounting member which is connected to the other of the vibration-generating portion and the vibration-receiving portion;

an elastic body which is disposed between the first mounting member and the second mounting member and which is elastically deformed due to inputted vibration from the vibration-generating portion;

a pressure-receiving liquid chamber whose partition is partially formed by

the elastic body and whose internal volume expands or contracts due to the deformation of the elastic body;

a sub-liquid chamber which communicates with the pressure-receiving liquid chamber through a limiting path such that liquid can flow mutually between the pressure-receiving liquid chamber and the sub-liquid chamber;

a movable partition portion which forms a part of a partition of the sub-liquid chamber, and which is movably supported in a direction in which the internal volume of the sub-liquid chamber expands or contracts;

an equilibrium chamber which is disposed adjacent to the sub-liquid chamber, through the movable partition chamber;

a switching valve which is connected to the equilibrium chamber, and which is connected to a negative pressure supply source and an atmospheric pressure supplying source, respectively, to permit the equilibrium chamber to communicate with one of the negative pressure supply source and the atmospheric pressure supply source; and

a control means which controls the switching valve to alternatively introduce negative pressure and an atmospheric pressure into the equilibrium chamber synchronous with the inputted vibration from the vibration-generating portion, wherein

a plurality of the switching valves is connected to the equilibrium chamber, and is successively and selectively operated by the control means synchronous with the inputted vibration from the vibration-generating portion.

3. The vibration-proof apparatus according to 1 or 2, characterized in that the plurality of the switching valves are connected serially, through pipes, to the equilibrium chamber.

4. The vibration-proof apparatus according to 1 or 2, characterized in that, when N switching valves are connected to the equilibrium chamber and F is the frequency of the inputted vibration from the vibration-generating portion, each of the plurality of the switching valves is successively and selectively operated substantially at the cycle of N/F .